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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/213,613	12/18/98	GUPTA	R 19898/5

EXAMINER	
CALDWELL, A	
ART UNIT	**PAPER NUMBER**
2154	6

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DATE MAILED: 10/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/213,613	Gupta et al.
Examiner	**Art Unit**
Andrew Caldwell	2154

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *three* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Dec 18, 1998*

2a)☐ This action is **FINAL.** 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideratio

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some* c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15)☒ Notice of References Cited (PTO-892)

16)☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

18)☐ Interview Summary (PTO-413) Paper No(s). _____

19)☐ Notice of Informal Patent Application (PTO-152)

20)☐ Other:

Part III DETAILED ACTION

Remarks

1. Claims 1-8 are presented for examination.

2. Although claims 1 and 6 meet the requirements of 35 U.S.C. 112(2), the language could be improved. As to claim 1 at line 12, the phrase *the service processor selectively operable* would parallel the language at line 10 if it were modified to be *the service processor is selectively operable*. As to claim 6, the phrase *at shared processor* at line 6 should be *at the shared processor*. During the normal review and rewriting of the claims, the Applicants should consider the issues identified above and make changes as necessary.

Claim Objections

3. Claims 1-5 and 7 are objected to under 37 C.F.R. 1.75(a) for failing to particularly point out and distinctly claim the subject matter of the invention. As to claim 1, there is no antecedent basis for the *shared processor* at line 5. For purposes of prior art rejections in this Office action, the shared processor will be construed as the *service processor*. As to claim 2, there is no antecedent basis for *the appropriate response* at line 4. For purposes of prior art rejections in this

Office action, this language will be construed as *an appropriate response*. Claim 2 is also objected to because it is unclear whether *the mailbox* at line 4 is the respective mailbox from which the command was read or another of the mailboxes introduced at line 6 of parent claim 1. Claim 3 contains the same problem at line 4. For purposes of prior art rejections in this Office action, *the mailbox* in claims 2-3 will be construed as *the respective mailbox*. As to claim 5, there is no antecedent basis for *the backplane* at lines 2 and 4. For purposes of prior art rejections in this Office action, the backplane will be construed as a bus connecting the service processor with the line processor(s) and shared memory. Claim 7 is objected to for the same reasons as claim 2 and will be construed in a similar manner.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a),

the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kedem, U.S. Patent No. 6,167,485, in view of van der Wal, A., "Efficient Interprocessor Communication in a Tightly Coupled Homogenous Multiprocessor System," Proc. of the IEEE Workshop on Future Trends of Distributed Computing Systems, IEEE, pp. 362-368, October 1990.

7. Regarding claim 1, Kedem teaches the invention substantially as claimed by disclosing a system comprising a shared service processor (Fig. 4 elem. 47) providing a single point of contact for a user (Col. 10 lines 23-29) interfacing with at least one line processor (Fig. 4 elem. 42 where the host adapter implemented using general purpose processor per Col. 9 lines 34-39; Fig. 4 elems. 45a-45d where the disk adapters are implemented using general purpose processors per Col. 9 lines 45-47), the shared processor in electrical communication with shared memory (Fig. 4 elem. 43 shared cache memory). Kedem teaches that the host adapter processor and the disk adapter processors communicate using mailboxes in the shared cache memory (Col. 10

lines 12-22). Kedem also teaches how the data verification and repair process is implemented by a primary disk adapter processor that uses mailboxes to send commands to and receive responses from secondary disk adapter processors (Col. 13 lines 1-15).

8. Kedem however does not specifically teach how the service processor communicates with the host adapter processor and the disk adapter processors. More specifically, Kedem does not teach a shared memory including mailboxes operable to enable communication between the at least one line processor and the service processor. Nor does Kedem specifically teach a system wherein:

a. The service processor is operable to selectively deliver commands to a respective mailbox of a selected one of said at least one line processor; and

b. the service processor is selective operable to issue a system management interrupt to any or all of the at least one line processors, the interrupt signaling to the at least one line processor to access a respective mailbox in the shared memory.

9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Kedem to use mailboxes in the shared cache memory to provide communication between the service processor and the host and disk adapter processors. Kedem teaches that the service processor can be programmed to perform the data verification and repair process functions of the primary disk adapter (Col. 12 lines 14-17).

From this teaching, a person of ordinary skill in the art at the time the invention was made would make the modification discussed above because using a common interprocessor communication scheme throughout the system would allow the system designer to reuse the existing code implementing mailboxes, thus reducing development costs.

10. As modified, Kedem teaches a system in which the service processor is operable to deliver commands to a respective mailbox of a selected one of said at least one processor (Col. 10 lines 12-2 describing mailboxes; Col. 13 lines 1-15 with service processor commanding the primary and passive disk adapters to write data into cache by writing to the mailbox).

11. However, Kedem as modified does not explicitly describe a system in which the service processor is selectively operable to issue a system management interrupt to any or all of the at least one line processors, the interrupt signaling the at least one line processor to access a respective mailbox in the shared memory.

12. On the other hand, van der Wal teaches a mailbox-based interprocessor communication system in which the sending processor generates an interrupt to attract the attention of the target processor after writing a message to a mailbox (p. 362 Col. 2 second complete paragraph).

13. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine van der Wal's

teaching regarding the use of interrupts to indicate to the intended recipient processor that a message is available in the mailbox with the mailbox interprocessor communication system of Kedem. In the resulting combination, the service processor would issue an interrupt to the selected line processor after writing a command to the respective mailbox. In addition, the line processor would issue an interrupt to the service processor after writing an appropriate response to the mailbox. As to motivation, although Kedem does not explicitly describe how the processors determine whether messages are available in the mailbox, a person of ordinary skill in the art at the time the invention was made would have recognized that Kedem's system could not function without this ability. Given the art-recognized choices of polling or using interrupts, a person of ordinary skill in the art at the time the invention was made would have selected the interrupt based system because, as van der Wal explicitly teaches, using interrupts reduces bus contention (p. 132 Col. 2 second complete paragraph). Reducing bus contention is an important consideration in a bus-based system like Kedem.

14. As to claim 2, the combination of Kedem in view of van der Wal as applied to claim 1 above teaches these features. Kedem teaches a system in which the line processor accesses the command delivered to a respective mailbox, interprets the command, and then delivers an appropriate response to a mailbox (Col. 13 lines

9-15). These actions occur in response to the line processor receiving a system management interrupt for the reasons given above in paragraph 13.

15. As to claim 3, the combination of Kedem in view of van der Wal teaches a system wherein the line processor is operable to assert its system management interrupt line to the service processor after delivering the appropriate response to the mailbox for the reasons discussed above in paragraph 13.

16. As to claim 5, Kedem teaches a system in which the at least one line processor is operable to conserve backplane bandwidth by selectively consolidating selected tasks onto the service processor to reduce the number of accesses to the backplane (Col. 11 lines 21-41 line processor initiating verification and repair process by the service processor after periods of heavy activity).

17. As to claim 6, it is a method claim that generally corresponds to apparatus claim 1 except for the following limitations. Claim 6 refers to a shared processor that corresponds to the shared service processor of claim 1. In addition, claim 6 at lines 5-6 includes the limitation of providing mailboxes *at* the shared processor. This language requires the mailboxes to be located with the shared processor. Kedem Figure 4 shows a bus interconecting the host adapter (elem. 42), disk adapters (elems. 45a-45d), shared memory (elem. 44), and the service processor (elem. 47). A person of ordinary skill

in the art at the time the invention was made would have recognized that Figure 7 describes the electrical interconnection of the components and does not necessarily represent their physical placement. It would have been obvious to one of ordinary skill in the art at the time the invention was made to physically locate the shared memory with the service processor, by placing them on the same board in order to conserve space. As to any limitation not specifically discussed, the reasons for rejection should be apparent from the discussion of claim 1 above.

18. As to claims 7-8, they are method claims whose additional limitations correspond to those introduced in apparatus claims 2-3 respectively. They are therefore rejected for the same reasons.

19. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kedem, U.S. Patent No. 6,167,485, in view of van der Wal, as applied to claim 1 above, and further in view of Sato et al., U.S. Patent No. 5,133,071.

20. As to claim 4, the combination of Kedem in view of van der Wal teaches the invention substantially as claimed. See the rejection of claim 1 above.

21. The combination of Kedem in view of van der Wal does not teach a system in which the service processor is electrically

connected to nonvolatile memory for storing initialization and/or boot information for the service processor and at least one processor.

22. Sato on the other hand teaches a service processor electrically coupled to a nonvolatile memory/disk drive (Col. 1 lines 17-21). The disk drive stores operating programs for embedded processors/channel controllers. The service processor loads these operating programs into memory when the system powers on (Col. 1 lines 17-26). These operating programs are initialization and/or boot information. Upon considering Sato's teachings, a person of ordinary skill in the art at the time the invention was made would have recognized that Sato's teaching is merely a specific example of the general principle of having a service processor configure a system by loading the executable code for an embedded processor at power up.

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Sato's teaching with the system of the combination of Kedem in view of van der Wal by attaching a disk drive to the Kedem's service processor and then having Kedem's service processor load executable programs from the disk drive into the memories of the host and disk adapter processors at power up. Kedem teaches that the service processor configures the components of the storage system (Col. 10 lines 26-27). Based on this teaching, a person of ordinary skill in the art at the time the invention was made

would have made the combination because storing the host and disk adapter programs on the service processor's disk drive rather than in ROM co-located with the individual processors would make software upgrades easier.

24. As to the service processor, Sato does not explicitly teach that the service processor boots from its attached disk drive. However, official notice is hereby take of the fact that processors with attached disk drives commonly boot from programs stored on the attached disk. It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of which official notice is taken with the system of the combination of Kedem in view of van der Wal and further in view of Sato by having the nonvolatile memory attached to the service processor store initialization and/or boot information for the service processor. This combination would have been obvious because storing the service processor boot and/or initialization information on the attached disk drive makes upgrades to the service processor software easier.

Conclusion

25. The following are considered pertinent to applicant's disclosure. Nelson et al., U.S. Patent No. 5,928,367, teaches a messaging system using mailboxes and interrupts. Kedem, U.S. Patent No. 6,195,761, includes a disclosure similar in scope to

Kedem, U.S. Patent No. 6,167,485, which was used in the prior art rejections above.

26. A shortened statutory period for reply to this Office action is set to expire THREE MONTHS from the mailing date of this action.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Caldwell, whose telephone number is **(703) 306-3036**. The examiner can normally be reached on M-F from 9:00 a.m. to 5:30 p.m. EST.

If attempts to reach the examiner by phone fail, the examiner's supervisor, Meng-Ai An, can be reached at (703) 305-9678. Additionally, the fax numbers for Group 2100 are as follows:

Official Responses:	(703) 746-7239
After Final Responses:	(703) 746-7238
Draft Responses:	(703) 746-7240

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist at (703) 305-3900.

Andrew Caldwell

Andrew Caldwell
703-306-3036
September 30, 2001